

MODERN ACCESSIBLE APPLICATION OF THE SYSTEM BLENDER IN 3D DESIGN PRACTICE

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ABSTRACT

In recent years there has been increased interest in systems with a free license. In the field of 3D design a powerful system with a free license is the Blender. With its small volume, not any serious high demands on hardware systems, combined with many advantages and innovations Blender 3D graphics system is gaining more followers. This trend bodes fast nonlinear positive progression, which gives a reason the use of the system open source Blender in design practice to be considered appropriate and correct.

Key words: Blender, design, free license

1. INTRODUCTION

It is known that in the field of 3D graphics design there is a wide variety of software products [4]. 3D software developers constantly try to implement new applications and enhancements to the packages they offer [8]. The fact is that sometimes the prices of some of the paid 3D graphics programs are inaccessible to some users. [4] Large data capacity, high hardware requirements are also a factor in determining the appropriate 3D system. In recent years the requirements for the quality of the final product have risen in regard to the software package capacity, the design approaches in the process of computer design and especially the final versions of visualization of static and animated models [3]. Given these factors, choosing the appropriate 3D graphics system is an important condition in the design project. This justifies the introduction of Blender in design practice to be recommended. Free license, open source, convenient interface multilateral aspects of design and lightweight platform by hardware requirements makes Blender a modern technological tool preferred by many users [5, 9].

Reaching these advantages is possible due to hard work and a long period of development of Blender to producing professional 3D application available with its free license and open source.

2. DEVELOPMENT OF BLENDER

In 1988 the Dutch animation studio "NeoGeo" was co-founded by Ton Roosendaal [7]. In the next few years "NeoGeo" became the largest 3D animation studio in the Netherlands. For their own needs the company develops 3D tool which basis in the future will be the rewritten Blender. In 1998 Ton founded a new company NaN (Not a Number) with the aim to develop Blender, spread it commercially on the market, and reach consumers. It is remarkable that at this time the main program was free with the exception of several modules, which is considered as innovation, given that similar software products were very expensive and unaffordable for certain users [1]. As a result of different adverse reasons in early 2002 NaN investors decided to suspend further operations with the software product. In May 2002 Ton and Blender constructors do not give up and create a nonprofit Blender Foundation in support of the large number of community enthusiasts and striving for the development of Blender continues [2]. Because the application was owned by investors of NaN in July 2002 a joint decision has been made to redeem the code of the program. The requested amount of €100,000 was collected in just two months and gained full ownership of members of the movement Open Source [1, 2, 6]. On October 13, 2002 Blender is released under the GNU GPL. The aim of the movement Blender Foundation (a nonprofit public benefit corporation) is:

- To give designers-users worldwide a full access to 3D technology which stands Blender;

- To provide service to active users and developers of Blender;
- To maintain and improve the existing product Blender by commonly available operating system with a source code licensed under the GNU GPL;
- To organize a system which supports voluntarily the running costs fund.

In 2005 Project Orange Blender Foundation launches and the world's first Open Movie "Elephants Dream" is created, using Blender as a main instrument and other open source software. Next achievement is Project Peach (which created the movie "Big Buck Bunny" – in April 2008). A little later, in September 2008, on the basis of the film a free computer game "Yo Frankie!" is released, and the project was called Apricot. In 2010 a significant success is the completed Project Durian, releasing the third Open Movie, "Sintel" [1].

Official images of the covers of successful films made by Blender are shown in Fig. 1 (a), (b), and (c).



Fig.1. Successful film projects released by Blender (a) The world's first Open Movie, „Elephants Dream“, (b) „Big Buck Bunny“, and (c) „Sintel“

3. INFORMATION, LICENSE, AND STRUCTURE OF BLENDER

In the last few years in parallel to the implementation of successful films and other projects, the possibilities of the program Blender in the field 3D design significantly increased. This serves as a pretext for many designers to focus on Blender. This serious choice is not only because Blender is with a free license, but also because of the following advantages that are given to users:

- Blender is released under the GNU General Public License (GPL, or “free software”, <http://www.gnu.org/copyleft/gpl.html>; Fig. 2(a)). This license grants people a number of freedoms (<http://www.blender.org/about/license/>; Fig.2(b)): free to use Blender, for any purpose; free to distribute Blender; can study how Blender works and change it; can distribute changed versions of Blender;

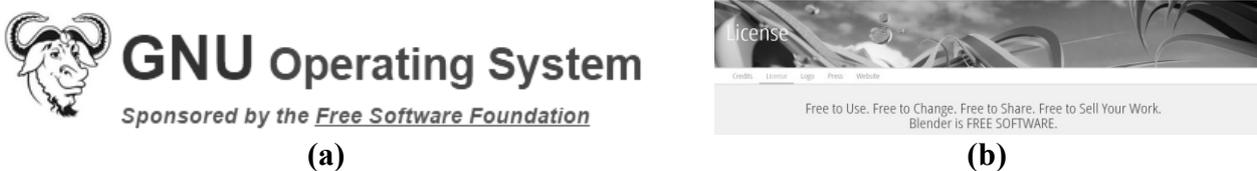


Fig.2. General Public License (a) GNU (official web site: <http://www.gnu.org/copyleft/gpl.html>;) (b) License grants people a number of freedoms (official web site: <http://www.blender.org/about/license/>)

- If desired, it is possible to reprogram the software in a positive aspect and subsequently to be spread to a new species;
- Blender is compatible with OS Windows, Linux, Mac, FreeBSD, and can be downloaded free from the official website address <http://www.blender.org/download/>;
- Users receive responsiveness and maintenance, also can actively participate with comments and suggestions;
- The new versions come out relatively quickly, and added innovations can quickly be integrated into the design practice;
- Programming language Python.

4. FUNCTIONAL DESIGN FEATURES OF BLENDER

A very strong feature is the developed multilateral directions to help designers and developers of software and interactive applications. At the time of writing this article the functional design features of Blender 3.74 are pointed and are shown in Table 1 (<http://www.blender.org/features/>).

Table1. Blender Features

FEATURES	INCLUDING
Photorealistic Rendering	GPU & CPU rendering; Realtime viewport preview; HDR lighting support Permissive License for linking with external software.
Fast Modeling	Keyboard shortcuts for a fast workflow; N-Gon support; Edge slide, collapse and dissolve; Grid and Bridge fill; Python scripting for custom tools and add-ons.
Realistic Materials	Key features: Complete Node Support for full customization; Physically accurate shaders like glass, translucency and SSS; Open Shading Language (OSL) support for coding unique shaders.
Fast Rigging	Envelope, skeleton and automatic skinning; Easy weight painting; Mirror functionality; Bone layers and colored groups for organization; B-spline interpolated bones.
Animation toolset	Automated walk-cycles along paths; Character animation pose editor; Non Linear Animation (NLA) for independent movements; IK forward/inverse kinematics for fast poses; Sound synchronization.
Sculpting	20 different brush types; Multi-res sculpting support; Dynamic Topology sculpting; Mirrored sculpting.
Fast UV Unwrapping	Fast Cube, Cylinder, Sphere and Camera projections; Conformal and Angle Based unwrapping (with edge seams and vertex pinning); Painting directly onto the mesh; Multiple UV layers; UV layout image exporting.
Full Compositor	Library of nodes for creating camera fx, color grading, vignettes and much more Render-layer support; Full compositing with images and video files; Ability to render to multiLayer OpenEXR files; Multi-threaded.
Simulations	Fluid – Realistic water and fluid simulations; Smoke – Billowing smoke with flames and scene interaction; Hair – Beautiful wafts of hair that blows in the wind and interacts with collisions; Cloth – Amazingly realistic cloth simulations for clothing and environments; Rigid Body Physics – Makes any object destructable and collidable; Particles – For creating things like rain, sparks and shrapnel.
Game Creation	Ability to port your models to any third-party game engine; Create or code your own game logic; Full Bullet Physics integration; Python scripting API for advanced control and AI; Support for all OpenGLTM dynamic lighting, toon shading, animated materials as well as Normal and Parallax Mapping; Playback of games inside Blender without compiling or preprocessing; 3D spatial audio using OpenAL.
Camera and Object tracking	The Camera and Object Tracker includes: Auto and manual tracking; Powerful camera reconstruction; Real-time preview of your tracked footage and 3d scene Support for Planar tracking and Tripod solvers.

FEATURES	INCLUDING
Library of Extensions	Users can turn on or off easily extensions. Some existing extensions include: Generators for trees, terrain, ivy and clouds; Fracture Objects; 3D Printing Toolbox; Rigify meta-rigging system; Import and Export format support for AfterEffects, DirectX, Unreal Game Engine and more.
Video Editing	Video Editor allows to perform basic actions like video cuts and splicing, as well as more complex tasks like video masking; Live preview, luma waveform, chroma vectorscope and histogram displays; Audio mixing, syncing, scrubbing and waveform visualization; Up to 32 slots for adding video, images, audio, scenes, masks and effects; Speed control, adjustment layers, transitions, keyframes, filters and more.
File Formats	Image: JPEG, JPEG2000, PNG, TARGA, OpenEXR, DPX, Cineon, Radiance HDR, SGI Iris, TIFF; Video: AVI, MPEG and Quicktime (on OSX); 3D: 3D Studio (3DS), COLLADA (DAE), Filmbox (FBX), Autodesk (DXF), Wavefront (OBJ), DirectX (x), Lightwave (LWO), Motion Capture (BVH), SVG, Stanford PLY, STL, VRML, VRML97, X3D.
Flexible Interface	User customize; Consistency across all platforms, no disruptive pop-up windows; crisp text (support for retina on OSX).

5. CONCLUSION

The system Blender is a powerful technological tool assisting 3D designers. Providing complete freedom of action by the developers of Blender to consumers is a priority - officially and publicly regulated. Thus the stimulation of users - designers is strongly emphasized. This allows users to develop their full potential, and in parallel, they themselves become co-authors in the development of Blender, which outlines the perspective of future fast interconnected prosperity between the open source system Blender and designers.

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